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A PROPOSED AËRIAL EXPEDITION FOR THE EXPLORATION OF THE UNKNOWN INTERIOR OF NEW GUINEA

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Among the very few tropical regions of the earth that still retain to any considerable extent their ''white spaces'' New Guinea is the most noteworthy. Within the tropics there is no other area that has been, for so long a time, the object of systematic and strenuous exploration. Nowhere else has the onward-pressing explorer encountered such stubborn resistance as when he has tried to remove the mystic veil that still shrouds the interior and endows it with the charm peculiar to the unknown. Since the time when, in the dim, far-away days of the sixteenth century, the island was once sighted by Jorge de Meneses, a Portuguese driven out of his course by hard weather, nearly a thousand different explorers, single-handed or as leaders of strong and well-equipped expeditions—which at times have been of an international character and composition—and actuated by various motives, have set about the exploration of this great island. Nevertheless the fact remains that New Guinea, with its still unknown interior, is, within the tropics, the largest ''white space'' on earth.

Hardly a year passes without discoveries of the most sensational kind being made in this part of the world. Only a year or two ago, in the Dutch part of the island, there was discovered a large new oviparous mammal, an ant-eating porcupine, about a yard in length. In 1910 the expedition sent out to the Dutch part of the island by the British Ornithologists' Union, under the leadership of Mr. Walter Goodfellow, put on record the existence of a new race of men, the so-called Tapiro dwarfs, living on the heights of the Nassau Plateau. And it was only a few years ago that the well-known Dutch explorer, Dr. Lorentz, after two previous but unsuccessful expeditions, succeeded in reaching the long-desired goal, Wilhelmina Peak in the

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central range, 15,585 feet high. He is the first white man to have set foot upon New Guinean snow.

As early as 1910, during my first expedition to Australia,[1] New Guinea already loomed before my fancy as the future object of my exploratory work. This idea grew upon me more and more, especially after I met in 1912 and 1913, at Brisbane, Sir William McGregor, the Governor of Queensland.

Among living explorers Sir William McGregor is, without doubt, the one who possesses the most intimate knowledge of New Guinea. In the long period from the early eighties to 1900 he made a series of journeys within the British part of the island for the purpose of studying it. Later, in his capacity of Lieutenant-Governor, he did much traveling, for practical purposes and on duty, but always with an eye open to the possibility of fresh discoveries. In 1906 and 1908 he climbed the highest summits of the littoral Owen Stanley Range, 13,000 feet in altitude, and also succeeded in traversing the southeastern peninsula.

Sir William McGregor strongly advised me to devote my exploring work in the future to New Guinea, where to this day so much that is still unknown remains to be revealed. I have accordingly been revolving this suggestion in my mind more and more and herewith present a plan of exploration which promises useful results.

Geographical Features of New Guinea

International Partition.—New Guinea is, as we know, divided among three nations: Holland, Germany, and Great Britain. All territory west of longitude 141° E. belongs to Holland. The boundary between British and German territory follows a broken line, dividing the eastern half lengthwise. The final partition of the island took place in 1884, when the German portion, which up to that time had only been a protectorate, was proclaimed a crown colony. The British part of the island—also called Papua, or "the Territory"—was incorporated with the Commonwealth of Australia in 1901, and later, by a special act of November 16, 1905, the so-called "Papuan Act," the country was placed under a Lieutenant-Governor subordinate to the Governor-General of Australia.

Topography.—New Guinea is situated just south of the equator, between the parallels of 0°19′ and 10°43′ of south latitude, and extends in an east-southeasterly direction from 131° to 151° east longitude. With its area of 300,000 square miles, it is larger than the Scandinavian peninsula and is, next to Greenland, the biggest island in the world. In the east, as in the west, it forms peninsulas. Eastwards, New Guinea is continued by several large groups of islands, Neu Pommern and the Louisiade Islands, and farther east by the Solomon Islands. Taken together with the latter it may be considered the remains of a former connected land complex. It is separated from Australia by Torres Strait, 96 miles in width. The two large bays, Geelvink Bay in the northern part and the Gulf of Papua in the southern, naturally divide the island into a central main land and two peninsulas.

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[1] Cf. the writer's account: Svenska biologiska expeditionen till Australien, 1910-1911, *Ymer*, Vol. 32, 1912, pp. 397-434; and his "Bland vilda Djur och Folk i Australien" [Among Wild Animals and Peoples in Australia], Bonnier, Stockholm, 1915.—EDIT. NOTE.

The northern coast of New Guinea is mostly steep and high; in other parts the shore is flat and fringed by low-lying, swampy mangrove forests, extending inland for many miles. There the country is very broken and rugged, and intersected by high ranges of hills with valleys and plateaus between. The northwestern peninsula is ridged by a chain of high mountains, the Arfak Range (9,500 ft.). Beyond the neck of the peninsula and continuing to the east are the Charles Louis Mountains and the Snowy Mountains, or, as they are called nowadays, the Nassau Range, culminating in the snow-clad summits of Mount Idenburg (15,270 ft.), Carstensz Peak (15,706 ft.), and, farther east, Wilhelmina Peak (15,585 ft.) and Mt. Juliana (14,665 ft.). To the east of these are the Victor Emanuel and Sir Arthur Gordon Ranges, both close to the Anglo-German border. Still farther east we find the Bismarck Range, which is often covered with snow, and, forming the southeastern peninsula, the mighty Owen Stanley Mountains, the highest peaks of which are Mt. Albert Edward (13,100 ft.) and Mt. Victoria (13,150 ft.). Thus it will be seen that, from west to east,

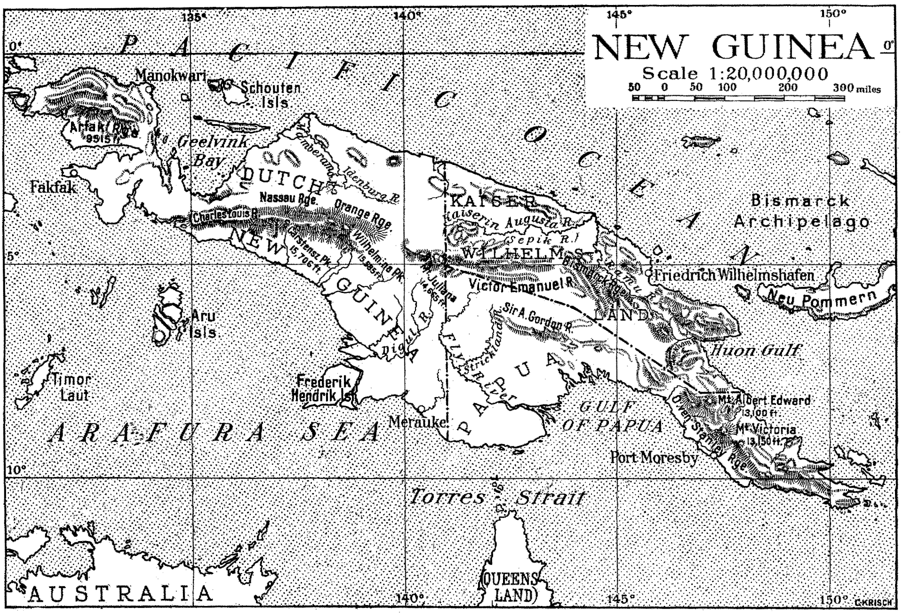

FIG. 1—Sketch-map of New Guinea.

a more or less connected system of mountains intersects the interior of the island, like an immense backbone.

As to the interior of the island, it is as yet practically unknown, but from the highest peaks that have so far been climbed the presence of still loftier mountains, with peaks mantled in dazzling white snow, and, intervening, less elevated expanses of ground have been revealed.

From a geological point of view, the island is very imperfectly known. However, we have reason to believe that the lowland south of the central ranges is in age and structure related to the older lands of Australia, while the ranges themselves are of more recent age and are akin to the partly submerged mountain arcs characteristic of eastern Asia. The relatively recent volcanic activity of the northern coast and the Bismarck Archipelago seems to attest this.

Climate.—As New Guinea is situated very nearly on the equator, its climate is hot and damp. At least, such is the case in the coast regions, so far the only parts fairly well known. But since from the heights of the coastal ranges lofty mountains may be seen, the summits of which are capped with snow, glaring white in the tropical sun, it follows that in the highlands of the interior a temperate climate must prevail. The mean temperature for the year is given as 79° F. On the north coast the warmest month of the year is March, with a mean temperature of 79°; on the south coast December is the warmest month, with a mean temperature of 82°. The coldest month is August, with a mean temperature of about 77°.

During the months of May to November—in the southern tropics the winter period—the southeast trades blow with unvarying strength, bringing a copious rainfall in parts. During the rest of the year, which constitutes the summer, the northwest monsoon sets in, frequently deluging the northwestern and western parts of the island with tropical cloudbursts and violent and persistent torrential downpours.

In the southeastern parts a dry season prevails during the winter, but such is not the case on the north coast, where rains fall every day in the year, often accompanied by violent electric discharges. This coast accordingly shows the heaviest rainfall, namely 79 to 118 inches, varying according to locality. Higher up in the mountains considerably more rain falls, and it is definitely stated that, in places, as much as 382 inches has fallen in a year. In especially wet years the rainfall in the low-lying parts has varied from 197 to 236 inches.

As a natural consequence of the enormous rainfall, mighty watercourses traverse the country on their way down to the sea. The largest river in the island is the Fly River, in British territory. Its sources are not yet known, but they are probably to be found in the mountains on the Anglo-German border. This river drains an area of enormous extent. The length of its course from the sea to the Anglo-German border is estimated at 620 miles. It is navigable, at least for motor boats, for about

500 miles. It is under the influence of the tides as far as 200 miles from its mouth. All along its course the banks are covered with dark and dense primeval forest. The volume of its waters is very large. Other great rivers are the Markham, discharging into Huon Gulf; the Ramu, with its sources in the Bismarck Mountains; the Kaiserin Augusta, or Sepik, River, which drains large regions of the north, and, with its tributaries, extends up to the Victor Emanuel Mountains; and the Mamberamo, which, with its affluent, the Idenburg River, drains the northern slopes of the central range in Dutch New Guinea.

As far as we know, no stagnant bodies of water are to be found, but it is nevertheless highly probable that there are some lakes in the level parts of the interior. In the following pages I shall return to this question in connection with another matter.

Vegetation.—Bearing in mind the equatorial position of New Guinea and its humid climate, it is to be expected that its vegetation would be of a very luxuriant character. A dense and uncompromisingly tangled primeval forest covers the greater part of the coast land, as well as the rising ground towards the mountains for a considerable distance. This "bush" bears a striking resemblance to the jungles of Queensland, although a stronger admixture of Indo-Malayan elements is noticeable. The coasts are edged with a belt of swampy mangrove forest, several miles in width, which at low water exposes a tangled network of main and auxiliary roots covered with slimy mud. Wherever one may look the eye is met by dark and dense primeval forest, with here and there a patch of lighter color. Such patches are grass-grown and are known by the name of *alang* steppes; they will be referred to again later.

At an altitude of about 10,000 feet the bush begins to show signs of becoming more sparse. The trees are hung with moss, all damp and dripping, and new elements begin to intrude themselves. Another ascent of 1,500 feet and the tree limit has been reached. Primeval forest gives way to an inferior kind of brushwood vegetation, with a dense undergrowth. Another thousand feet upwards, and an alpine vegetation appears, with fine greenswards and flattened plants of a northern alpine type.

Animal Life.—Leaving the vegetable kingdom for a cursory glance at the fauna of the island, we find that animal life in New Guinea is quite individual, even if obvious points of contact exist, on the one hand with the Malay Archipelago, and on the other with Australia. Of the mammals a good many are arboreal, but kangaroo types are also found in the parts where the country is more or less open. Two species of ant-eating porcupines are indigenous to the island; one of them attains a considerable size and, as has already been mentioned, was only discovered a year or two ago in the Dutch part of the island. Other mammals found here in a wild state are rats, bats, and a species of pig.

As is well known, New Guinea is pre-eminently the land of birds of paradise. In the silent depths of the primeval forest they display a wealth of color and a variety of shape which is without parallel in the animal kingdom. Wallace emphasized the greater splendor of this bird fauna as compared with that of Brazil. More than sixty species are indigenous to the island. Only one species has spread to Australia.

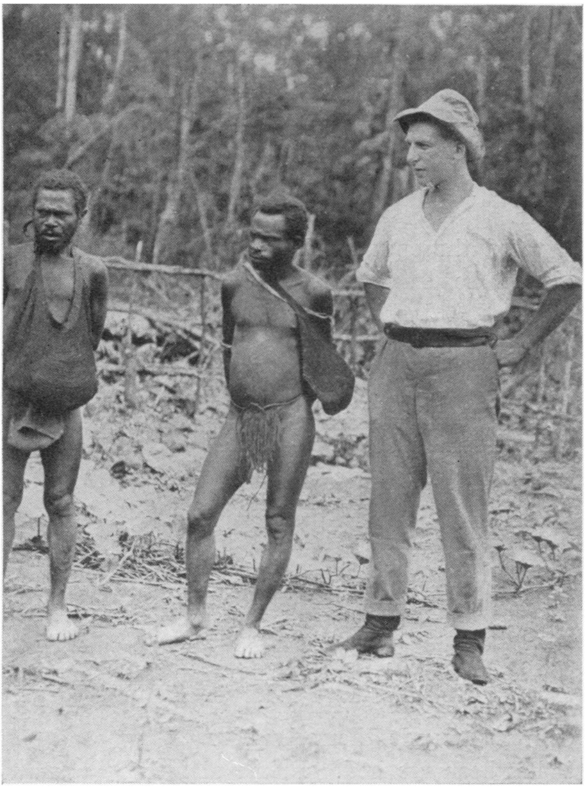

FIG. 2—Tapiro pygmies of New Guinea compared in stature with a white man. (From Capt. C. G. Rawling's "The Land of the New Guinea Pygmies," London, 1913.)

The rest of the indigenous bird life is also wondrously developed. In New Guinea parrots are found of the most varied colors and shapes. The smallest is of the size of a tomtit. Another comparatively ancient group are the pigeons, of which no less than thirty-nine distinct species live on the island. Six of the local bird families are, as to their habitat, restricted to the Australian-Papuan region, viz. the cockatoos, birds of paradise, cassowaries, Megapodes, Meliphagides, and the Podargides.

Population. — As is well known, New Guinea is the country of the Papuans. Terminology and grounds of classification have long been in a state of confusion and incommensurability. But it has become more and more customary to class as Papuans only the natives of New Guinea proper and of several adjacent islands. The natives of the Bismarck Archipelago and the Solomon Islands belong to the Melanesians, of which race also were the now extinct aborigines of Tasmania. The aborigines of Australia, on the other hand, form a distinct and typical group of their own.

As regards the Papuans, there has in the course of time taken place a considerable intermingling with other races. In the western parts there has been an infiltration of Malayan and Mongolian elements; in the north-east, of Melanesian, and in other parts, of Semitic strains. There has also been blending with the dwarf peoples. All this has resulted in making the anthropological questions particularly complex.

In mental development the Papuan is far superior to his neighbor to the south. Unlike him, he has attained the status of an agriculturist. He has learned to take thought for the morrow. He has emerged from the nomad stage and has become a dweller in fixed abodes. His huts are grouped together in village communities, and the first steps toward social specialization are undeniably evident. With tools of a primitive kind he cultivates the land about his huts. His domestic animals are the dog and the pig.

The Papuan is an artist of no mean ability. What a difference between the rude and primitive utensils of the Australian aborigine and those of the Papuan, which are tastefully ornamented or artistically plaited; or the beautifully and richly carved canoes, spears, bows, drums, masks of many kinds, mummies, etc., not to mention the so-called "spirit houses," wherein are deposited all sacred and ritual objects.

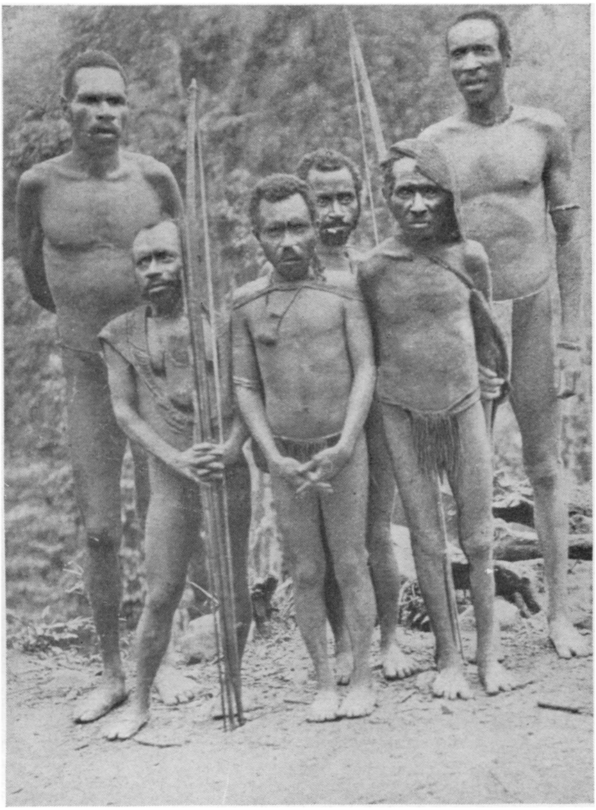

Fig. 3—Group of Tapiro pygmies of New Guinea, with two coast Papuans in the background. (From Capt. C. G. Rawling's "The Land of the New Guinea Pygmies," London, 1913.)

The hut of the Papuan is originally of a circular type, but the most varied modifications are to be seen. The hut is always built on pillars. In this way it is raised above the damp ground, and at the same time is rendered safer from enemies. The space underneath is utilized as a stable for the domestic animals, as a store-house or depository, or for similar purposes. The roof of the hut rests on one central pillar, or it may be supported by several. Roof and walls are built of poles, together with thick layers of wood-fiber and bark, interwoven with withes of the rattan palm, plaited around and between the building materials.

The floor of the hut may even be placed on pillars of such a height that the owner is obliged to make use of a small ladder in order to reach it. We find that this idea of elevated dwelling-places has been carried to its furthest development in actual arboreal habitations. High up in the top of a big tree quite a little village may be located, well protected against the attack of an enemy.

Along the coast, and in swampy regions the natives live in pile dwellings. Here they lead the primitive life of the fisherman.

Social relations between individuals, sexes, and tribes are of a varied character. As a rule, the natives occupy separate houses according to age and sex: the married women in one hut, the unmarried in another; the young men in one, and the married men in another; the elders in another, and so on.

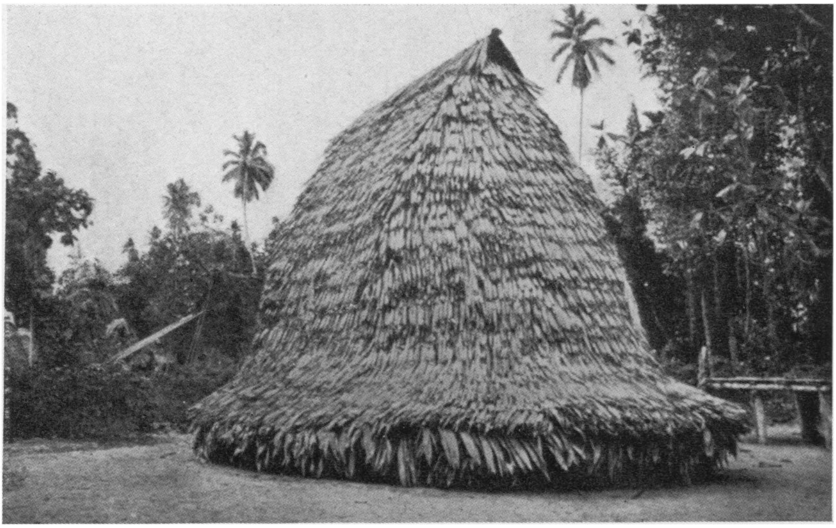

FIG. 4—"Spirit," or ceremonial, house, Sissanu, western part of northern coast of German New Guinea. (Figs. 4-7 and 9-12 are from R. Neuhauss' "Deutsch Neu-Guinea," 3 vols., Berlin, 1911.)

Woman's social position is a somewhat lowly and oppressed one. Polygamy is allowed, but in practice is only indulged in by those who are well off, such as the chiefs, the witch doctors, etc. The wife is acquired by purchase, and is bought by the tribe. To her alone is acknowledged the ownership of her child, which the husband imagines to be once for all ready-made in her body.

A particularly interesting phenomenon to be observed in New Guinea is the sporadic appearance of dwarfs. They may generally be looked upon as instances of atavism. Up to about 1910 only solitary individuals, here and there, were known, but the subsequent discovery of the Tapiro dwarfs and the Goliath dwarfs—living in the mountains of that name in the Dutch territory—has established the existence of pygmy tribes.

We find that pygmy races appear in more than one part of the world. Even the ancient Egyptians told of pygmy peoples of the central and southern parts of Africa. Pygmies have long been known to exist in the Indo-Malayan regions, likewise in certain parts of Oceania.

From the existence in widely separated parts of New Guinea of cases of typical atavism, the conclusion was very properly drawn that, in the past, pygmy races were much more widely distributed than is the case in our own times. This was fully confirmed by the discovery of the above-mentioned two pygmy races. It is obvious that the pygmies would have to fall back when crowded by a race which was by far their superior in stature and bodily strength. And that such must have come to pass is shown by their occupation of the remote slopes of the Nassau Mountains, where no Papuans have settled, and by their not being met with, in any compact groups, in the coastal regions occupied by the Papuans.

The Tapiro dwarfs are distinctly a nation of hunters. They roam the mountains, armed with their bows and arrows. However, our knowledge of these people is, unfortunately, only very fragmentary. They live in a small village situated several hundred feet above the Tapiro mountain. When first seen by white men, they were exceedingly timid, and hid away all their women and children in the hills above their village. By degrees they became more accessible. They seem to maintain peaceful relations with their nearest Papuan neighbors. They walk about quite naked except for a girdle from which a fringe hangs down. They carry bags made of fiber, in which they keep all their movable property. They still use stone hatchets. They live in square huts, built on poles, with walls made of split tree-stems. Here and there they have tilled the soil and carry on the cultivation of bananas, taro, and other edible vegetables acquired by barter from the Papuans.

As to how the interior of the island is peopled, or if it is peopled at all, we know nothing. It has, however, been conjectured, and on very good grounds, that the numerous plateaus and valleys of the central parts of the island may prove to be inhabited by people of pygmy race, of whom we know nothing as yet. Mayhap descendants of the aboriginal inhabitants of the giant isle still live here. A rich and highly interesting field probably here awaits the fortunate pioneer explorer.

A matter of the very greatest interest is the fact that in New Guinea have been found indisputable traces of a prehistoric population. The fact is that in various parts of the island ethnographical objects of great age have been discovered, which are quite unfamiliar to the present inhabitants of the country. Their existence was first brought to light by Professor Neuhauss,[2] than whom no one is better acquainted with the German part of the island.

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[2] R. Neuhauss: Deutsch Neu-Guinea, 3 vols., Reimer, Berlin, 1911 (reviewed in *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 220-221).

The most interesting of these are perhaps the stone troughs, or mortars, with their pestles, which have been found in the region round Huon Gulf. They are of considerable size, and were evidently used for pounding hard substances or objects. What these objects may have been is not known. The natives of our own day have no use for stone mortars of this description, as they are not in the habit of pounding, or crushing, the harder kinds of seeds, fruits, or other requisites.

Among other things from archaic times there are some smallish images of stone, ornately sculptured, which, according to Neuhauss, show an artistic taste and skill of such high quality that it may be taken to be quite out of the question that the Papuans of our own time could have been able to produce anything like them.

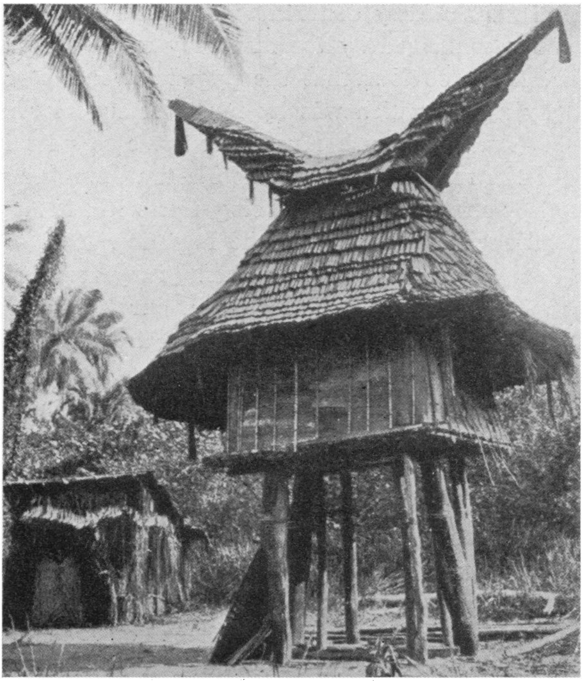

FIG. 5—"Spirit," or ceremonial, house, Malol, western part of northern coast of German New Guinea.

It is also probable that the stone hatchets still in use by the natives—although in our own days becoming more and more scarce—have belonged to an earlier, more primitive people. We do not know the locality where a single one of these tools has been manufactured, although the natives themselves tell us that they are made here, there, and everywhere—but without being able to point out any definite spot. Their archaic patination and otherwise old-time appearance indicate that they date from a past era.

The fact is thus established that New Guinea, also from an ethnological point of view, offers a multitude of unsolved problems. As yet we do not know anything of the mountain peoples who, in all probability, are to be found in the interior. There, perhaps, will be found the key to many of the anthropological riddles—as difficult of solution as they are interesting—that present themselves in the great island.

Outline of Proposed Expedition

Since, then, the compact belt of dense, swampy, and malaria-infested, primeval forest encompassing the highlands of the interior to this very day remains an impenetrable barrier, I have for many years past been thinking over a plan for reaching the interior by way of the air. Thus there would be eliminated at one stroke all the hardships and privations, well-nigh beyond human endurance, which are inseparably attached to the forcing of a passage through the coast belt.

It is well known what extraordinary progress has been made in modern aviation, particularly during the past two years. There is hardly any exaggeration in saying that man has conquered the air. One need no longer doubt the strength, carrying-power, reliability, and navigability of modern aëroplanes. At the western war front it happened only lately that two aviators, at an altitude of 13,000 feet, engaged in a sharp fight, which resulted in one of the combatants, damaged by his opponent's gunfire, falling headlong to destruction. Even in 1910 such an occurrence would have been deemed a sheer impossibility.

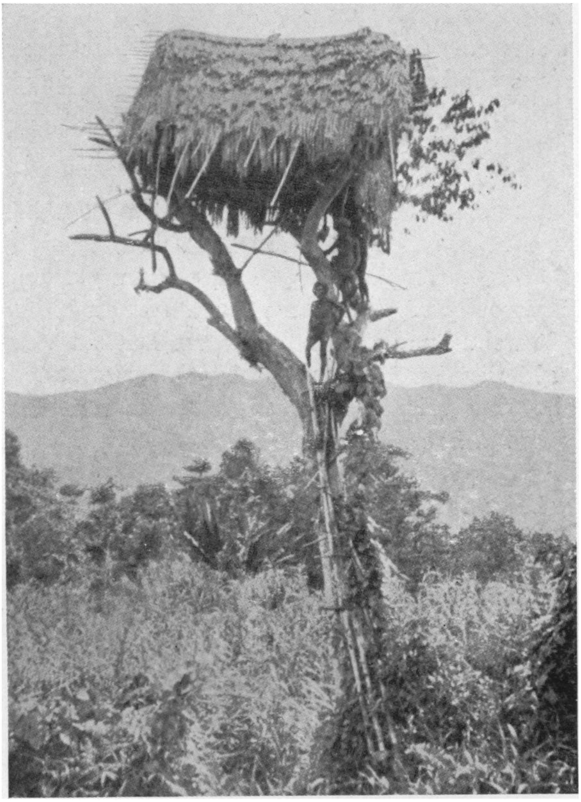

FIG. 6—Tree-house in German New Guinea.

By the adoption of powerful, fixed engines, two or more in number, missing of the motor—formerly of common occurrence, and the cause of many a disaster—has become more and more rare. In this eventuality the sole means of safety has, so far, consisted in descent by volplaning, and then only provided a suitable landing place was within reach.

My idea is to find, by means of aëroplanes, practicable landing places in the interior of the island whence communication could be established with one or more depot camps at the coast.

The solution of this problem I have in the main conceived as follows:

One machine should be built especially adapted to carry heavy freight. This should be a powerful, multicylinder biplane of a special type, to seat five passengers and to carry ballast of a minimum weight of 1,000 pounds. The building of a machine to meet these requirements would not in any way be difficult. The other machines should be biplanes of much lighter construction, seating only a pilot and an observer. The primary and most important business of these machines would be to search out and report upon possible landing places in the interior.

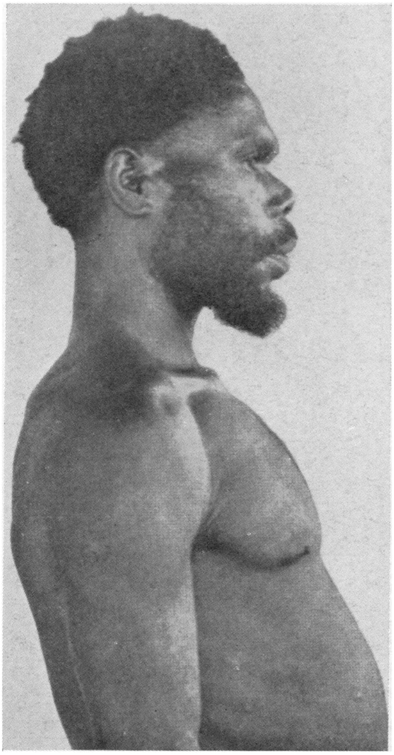

FIG. 7—A native (Papuan) of Bukaua, northern shore of Huon Gulf, German New Guinea.

Having located and fixed upon a suitable alighting place, the lighter machines would return to the depot camp at the coast. Thereupon, when meteorological conditions are as favorable as possible, the larger, freight-carrying machine would proceed to the selected landing place and discharge passengers, a first instalment of equipment, and provisions. This done, it returns to the depot in order to go back again to the inland camp without passengers, but with a full load of supplies. Regular trips between the two camps would subsequently be made as required, moving provisions and equipment from the coast to the inland camp, and returning with collections from the interior, to be immediately taken in hand and packed by the staff at the coast. Here would be stationed the lighter machines and their pilots, in constant readiness for duty.

The inland camp could be maintained until the surrounding country was carefully and systematically explored and mapped. With this done the camp could easily be moved to some other suitable site, and from this new center fresh exploration and research could be carried on. Once a satisfactory base has been established in the interior great possibilities are thrown open for exhaustive research work for a number of years to come.

Such matters as suitable machines, petrol, hangars, etc., are, as I shall show in what follows, easily disposed of, and of quite secondary importance to another matter which is momentous and decisive, that is, whether it is possible to land at all in the interior.

As early as three years ago, when I first met Sir William McGregor in Brisbane, I discussed with him, at length and in detail, my plan for an expedition into the interior of New Guinea by way of the air. He took up this novel idea with great interest and considered the project well within the limits of possibility. To my question as regards landing prospects he told me that for his part he considered there existed especial facilities, to judge from the character of the country in the highest parts of the Owen Stanley Range, which he had been the first to visit.

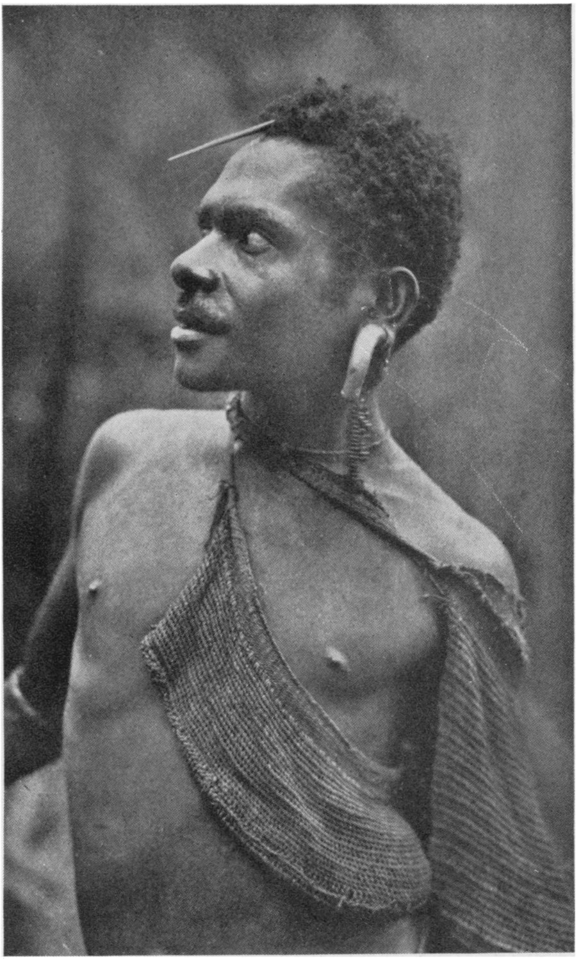

FIG. 8—A Tapiro pygmy of New Guinea. (From A. F. R. Wollaston's "Pygmies and Papuans: The Stone Age To-Day in Dutch New Guinea," London, 1912.)

Thanks to Sir William's researches we now know that the tree limit —i. e. the line above which the primeval forest does not extend—on the coastal mountain ranges begins at an altitude of about 11,500 feet. Above this height vegetation becomes more and more sparse, with dwarfed trees and low-growing brushwood, gradually changing into alpine meadows of soft grass, and prostrate herbs. When Sir William approached altitudes of 13,000 feet he met with a very quaint vegetation, in many respects reminiscent of the Alps and of northern Europe. Here, practically on the equator, he regaled himself with strawberries picked off the grassy lawns. He saw here several old acquaintances of his childhood: lady's mantles, with crystal dewdrops sparkling in the tropic sun, alp roses of the well-known rhododendron family in a variety of species, *Pedicularis, Lactuca, Leontodon, Myosotis, Ranunculus, Hypericum, Epilobium, Galium, Gentiana, Senecio, Veronica, Potentilla,* and other familiar northern forms.

In the interior, where highland plateaus with peaks covered with dazzling white snow predominate, the climate is bound to be considerably more temperate. From this it may be inferred that the tree limit will be found at a correspondingly lower altitude. In any case, the alpine meadows of the interior are sure to be far more widely distributed, and herein we see *the first of the landing possibilities on which we are reckoning.*

It is extremely probable that there is no connected forest belt in the interior. Indeed, it may be strongly doubted whether the primeval forest, composed as it is of Indo-Malayan elements, has been able to extend beyond and above the coastal ranges that shut off the interior of the island. It is, on the contrary, most probable that there will be found open savannas, sparsely dotted with gum trees, i. e. bush of North Australian character, and with the ground covered with soft grass. Moreover, such patches of eucalyptus bush are known to exist in the coast forests of New Guinea, where they appear, here and there, hemmed around by the dense and gloomy jungle.

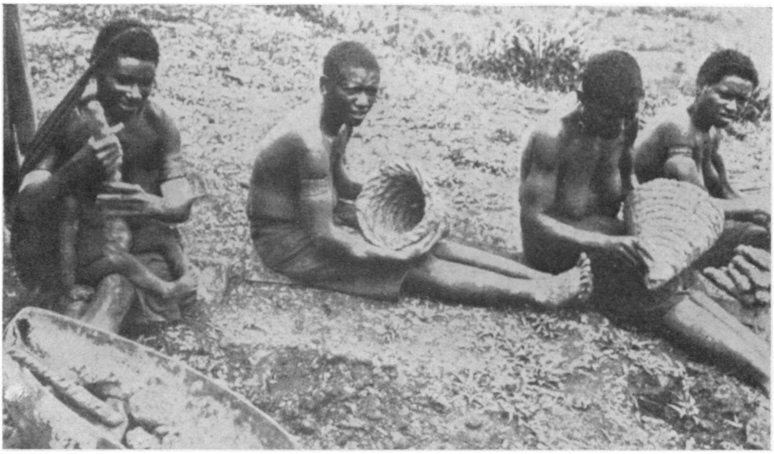

FIG. 9—Women potters, Laukanu, German New Guinea.

After the pebbles have been kneaded out of the clay, it is shaped into rolls 8 to 12 inches long (note the woman on the left; a number of rolls may be seen on the right edge of the photograph). These are bent into rings and placed one above the other to make the first rough form of the vessel.

There is reason to believe that the primeval forest in its compact form has not become predominant in the interior. The high coastal ranges and a more temperate climate must here have constituted a hindrance to its progress. On the rises and in the valleys there will probably be found open plains or thinly wooded forests, and thus we may count upon *a second possibility of landing.*

From our actual experience of the island—though, so far, very slight—we already know of the existence, here and there, of open, light-colored fields, some of them measuring many miles across. At first they were thought to be grass-grown, sun-bathed meadows, but this illusion was soon dispelled when the real nature of these lighter patches became known.

Fond hopes had been entertained that these tracts might some time be thrown open to cattle-rearing and agriculture. It was found, however, that the presence of these open fields was a sure sign of a barren and sterile soil, as they were only covered with a stiff and harsh kind of grass, the so-called *alang* grass (*Imperata arundinacea*), which in the dry season stands parched and yellow. On these plains a landing would not be practicable off-hand, but by dropping fire-bombs from the smaller, scouting aëroplane the grass could easily be burnt off, and in that way suitable landing places would be ready in a few days. Thus we have here *a third, and very excellent, possibility of landing.*

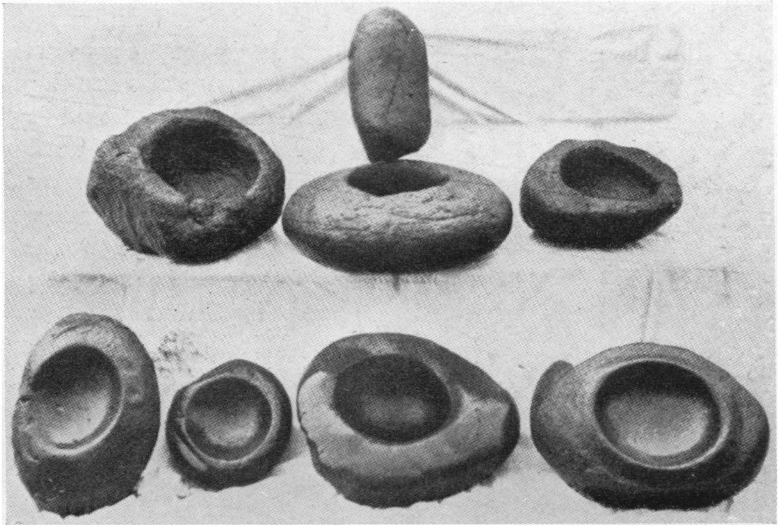

FIG. 10—Stone mortars, relics of prehistoric inhabitants of New Guinea.

By the foregoing I have shown that three different possibilities exist in the way of landing, viz. the open alpine meadows, covered with soft grass and low-growing herbs; the open or thinly wooded savannas that will probably be found in the interior; and, lastly, the *alang* steppes that are scattered here and there.

Personally, however, I am of opinion that a fourth possibility presents itself, and a most excellent one. In a country of so mountainous a character as New Guinea, with snow-clad peaks attaining a height of nearly 16,000 feet, and valleys in between, inland lakes are bound to exist. That such may be found even in the densest jungle was taught us by our experience in the primeval forests of Queensland, of which I have personally a thorough knowledge. In those jungles, quite unexpectedly, one comes upon splendid and gleaming sheets of water, mirroring the dark mass of the primeval bush by which they are walled in on all sides. They are of volcanic origin, or so-called crater lakes. Now that we know how intense volcanic activity has been, and still is, in New Guinea, it would surely be very strange indeed if such lakes did not exist in an area that is larger than the Scandinavian peninsula. It is also most probable that lakes of non-volcanic origin are to be found in the interior.

Here, then, lies before us *a fourth possibility of landing, i. e. by alighting with a hydroplane on some inland lake.* Hydroplane floats should accordingly be included in the equipment. They could easily and quickly be fitted to the larger biplane, which, though originally designed for alighting on land, would thereby immediately be converted into a hydroplane; also for the lighter machine, floats should be taken for an emergency. To find and locate what inland lakes might exist, as well as landing possibilities in general, would be the lighter machine's principal and most important task.

Wireless telegraph apparatus should also figure on the list of equipment. It could be erected at a reasonable cost. The importance of a wireless station is obvious, as thereby daily communication could be maintained between the inland camp and the depot at the coast.

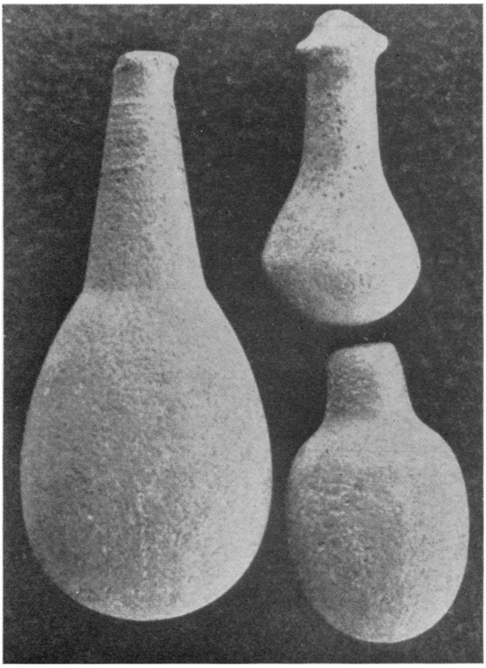

FIG. 11—Prehistoric pestles, made of lava, from Bukaua, German New Guinea.

The equipment should also include instruments for scientific observations, such as fixing positions, mapping, meteorological research, etc.

The composition of the proposed expedition and the duties of its members should, it seems to me, be as follows:

My own work would be generally to supervise the journey and progress of the expedition, and in particular to lead its scientific work, at least to begin with, until it had been ascertained whether it is possible to establish a base camp in the interior. This done, we could at once see about adding one or more specialists to the staff; first of all, a botanist and a geologist.

Four expert and experienced airmen should be of the party, as well as three well-qualified mechanics. They would constitute the flying staff of the expedition, but would naturally be very useful in other kinds of work when not actually engaged in their professional pursuits.

Two experienced topographers, either army staff officers or other persons proficient in surveying, should be of the party. To them would be entrusted the task of mapping the territory covered, not only by the methods that are generally employed, but also from the air by means of phototopography, and with a cinematograph. These more modern methods have, of late years, been used with great success. It is easily seen what an excellent opportunity here presents itself—whilst sailing over the expanses in an aëroplane—of taking bird's-eye views that afterwards could easily be made into maps.

Because it is proposed to make as full a collection as possible of zoölogical and botanical specimens, an expert taxidermist would be needed. He might also assist in other work. It is probable that the fauna, as well as the flora, of the interior highlands is quite distinct from that of the coast country, hence the importance of obtaining the fullest possible collections. In the high mountains of the coast there are, we know, a great many species of birds of paradise of very limited distribution, and therefore we have reason to expect that the fauna will be enriched, in particular, by new and interesting species of birds.

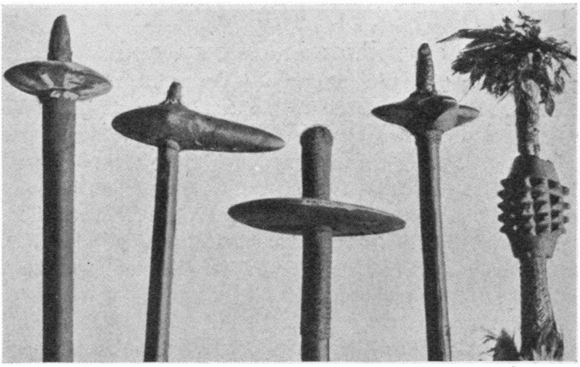
FIG. 12—Stone clubs in use by the present natives of New Guinea, but probably dating from an earlier people.

Should we succeed in establishing a fixed main camp in the interior, it follows that an increase in the staff would be necessary. A professional botanist, a geologist, and perhaps yet another scientist, might then be conveyed by aëroplane to the new field of research. Testing the machines for safety and navigability and preliminary practice in mapping and cinematographing the ground from an aëroplane would form essential elements in the preparations for this enterprise.

The problem of hangars for the machines is easily solved. A strong tent, pitched in a sheltered spot, is all that is required. At the depot on the coast a shed of corrugated iron could easily be put up.

As regards the carrying of petrol, the supply would naturally have to be directly proportionate to the distances that are to be flown. The subjoined plan shows the central portion of New Guinea with a square inscribed, the sides of which are 300 miles. This figure is intended to give a rough idea of what distances have to be reckoned with. The diagonal of this square is about 425 miles, or from each corner to the intersection about 215 miles. That this distance is well within the radius of action of an aëroplane is evident. With a speed of 60 to 90 miles an hour, it would only be a question of remaining in the air a few hours, above the forests and plateaus of the island. A petrol supply sufficient for a consecutive flight of ten hours can easily be carried.

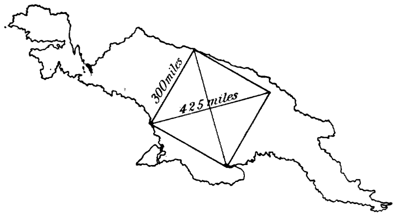

FIG. 13—Outline of New Guinea showing distances to be covered in exploring the interior.

As vast areas of still unexplored country are to be found within far easier reach than that—as for instance beyond the Nassau Plateau, and several others of the high coastal ranges, in Dutch, as well as in German and British, territory—it is clear that magnificent prospects are here open to whomsoever will be the first to utilize the aërial method of exploration.